

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN METTALLURGY ENGINEERING
SEMESTER: V

Subject Name: **Heat Treatment of Metals**

Sr. No.	Course Content
1.	Pyrometry: 1.1 Importance & Relevance 1.2 Resistance pyrometers :principles, construction and working. 1.3 Thermocouples pyrometry :principles, construction and working. 1.4 Radiation pyrometry :principles, construction and working. 1.5 Optical pyrometers :principles, construction and working.
2.	Annealing: 2.1 Principle, objectives & Methods. 2.2 Annealing temperature. 2.3 Types of Annealing. 2.4 Patenting.
3.	Normalising: 3.1 Principle, objectives & Methods. 3.2 Chain of temp for normalizing. 3.3 Difference between Annealing & normalizing.
4.	Hardening & Tempering: 4.1 Objectives of Hardening. 4.2 Methods of Hardening and quenching media. 4.3 Austenitic to martensitic transformations. 4.4 Hardenability. 4.5 Tempering objectives. 4.6 Stages of Tempering. 4.7 Temper colors. 4.8 Temper brittleness.
5.	T.T.T. Diagram: 5.1 Definition & its importance. 5.2 Construction. 5.3 T.T.T. diagram for different types of steel. 5.4 Factors affecting T.T.T. diagram & its limitations. 5.5 C.C.T. Diagram.
6.	Surface Hardening: 6.1 Objectives of surface Hardening. 6.2 Carburising. 6.3 Nitriding. 6.4 Cyaniding. 6.5 Induction Hardening & Flame Hardening.
7.	Heat Treatment of Non-Ferrous Metals & Alloys: 7.1 Precipitation Hardening. 7.2 Hardening of Al-Cu alloy system.

Laboratory Experiments:

1. Study of iron carbon Equilibrium Diagram.
2. Perform Rockwell Hardness Test. as per IS code.
3. Perform Annealing and Normalising heat treatment on steel specimen.
4. Perform hardening and Tempering Heat treatment on steel specimen.
5. Determination of Hardenability by Jominy end Quench Test.
6. Study of T.T.T. diagram.
7. Demonstrate effect of carburising on hardness of low carbon steel.
8. Demonstrate effect of nitriding on hardness of plain carbon steel.
9. Demonstrate Heat treatment Furnaces-I (Muffle furnace and salt bath furnace)
10. Demonstrate Heat treatment Furnaces-II (Induction and Carburising furnace)